

**Patent claims**

1. A method for detecting the beginning of combustion in  
an internal combustion engine (1) comprising several  
5 cylinders (2, 3, 4, 5) by means of a rotation speed  
signal determined for a shaft (6) of the internal  
combustion engine (1), in which
  - at least one segment signal (SS), whose signal  
length corresponds to an integral full rotation  
10 of the shaft (6), is extracted from the rotation  
speed signal, so that in the rotation angle range  
represented by the signal length each cylinder  
(2, 3, 4, 5) ignites one time,
  - a cylinder signal (ZS1, ZS2, ZS3, ZS4), which  
15 substantially reproduces the operational state in  
one of the cylinders (2, 3, 4, 5), is generated  
from the segment signal (SS),
  - the cylinder signal (ZS1, ZS2, ZS3, ZS4) is  
20 transformed into a cylinder frequency signal (FS  
1, FS2, FS3, FS4) in an angle frequency range and
  - a signal information indicating the beginning of  
25 combustion in the associated cylinder (2, 3, 4,  
5) is extracted from the cylinder frequency  
signal (FS 1, FS2, FS3, FS4) at at least one  
predefined angle frequency.
2. A method according to claim 1, **characterized in that**  
30 the cylinder signal (ZS1, ZS2, ZS3, ZS4) is generated  
by means of extraction of a partial signal from the  
segment signal (SS), the partial signal detecting the  
rotation angle range, within which the concerned  
cylinder (2, 3, 4, 5) ignites.
3. A method according to claim 1, **characterized in that**  
35 the operational state in the cylinder (2), for which  
the beginning of combustion is to be detected, is

the beginning of combustion is to be detected, is  
adjusted and in that the segment signal (SS) resulting  
from adjustment is used as a whole as the cylinder  
signal (ZS1) which is significant for this cylinder  
5 (2).

4. A method according to one of the claims 1 to 3,  
10 **characterized in that** the cylinder frequency signal  
(FS1, FS2, FS3, FS4) is generated by means of a  
discrete Hartley-Transformation (DHT) or a discrete  
Fourier-Transformation (DFT) or by means of digital  
filtering.
- 15 5. A method according to one of the preceding claims,  
**characterized in that** at least two successive segment  
signals (SS) are determined arithmetically.
- 20 6. A method according to one of the preceding claims,  
**characterized in that** for generating the rotation  
speed signal a transmitter wheel (7) is used and that  
the inaccuracies in the segment signal (SS) resulting  
from transmitter wheel errors are at least largely  
eliminated.  
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- 30 7. A method according to one of the preceding claims,  
**characterized in that** by means of a digital signal  
processing an improved segment signal (SS\*), in  
particular with a higher scanning rate, is generated.
- 35 8. A method according to claim 7, **characterized in that**  
the segment signal (SS) is subject to an interpolation  
method, in particular to a Lagrange- or a sinc-  
interpolation.
9. A method according to claim 7, **characterized in that**  
the segment signal (SS) is subject to a frequency

transformation, in particular to a discrete Hartley-  
Transformation or a discrete Fourier-Transformation.

5      10. A method according to one of the preceding claims,  
         **characterized in that** the signal information including  
         the beginning of combustion is used for regulating the  
         beginning of combustion.